ABSTRACT OF THE DISCLOSURE

The semiconductor device comprises a 2 - 6 nm-thickness channel layer 18 of SiGe formed over a silicon substrate 10; a gate electrode 22 formed over the channel layer 18 with a gate insulation film 20 formed therebetween; and a source/drain diffused layer 32 formed on both sides of the gate electrode 22. The thickness of the channel layer is set to be as thin as 2 - 6 nm, whereby the quantum confining effect can be caused in the channel layer. Accordingly, the effective band gap E_g of the channel layer can be large. The effective band gap E_g of the channel layer can be large, whereby the OFF-state current I_{off} can be decreased. Furthermore, the concentration of a dopant impurity to be implanted into the channel layer does not have to be high, and accordingly the electric fields vertical to the substrate surface never become strong. The scattering increase of the carriers in the interface between the channel layer and the gate insulation film can be accordingly suppressed. The concentration of a dopant impurity to be implanted into the channel layer does not have to be high, and the junction capacitance increase never takes place. Furthermore, a compression strain is implanted in the channel layer of SiGe, whereby the carrier mobility can be increased. Thus, the carrier mobility can be increased without the OFF-state current increase the ON-state current decrease and the junction capacitance increase. Thus, the operation speed can be increased without the OFF-state current increase and the ON-state current decrease.